

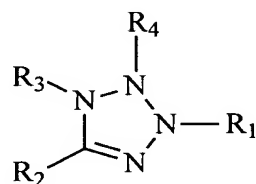
CLAIMSWhat Is Claimed Is:

5 1. An electrochemically-activated optical switch comprising a molecular system configured between a pair of electrodes, said molecular system including at least one organic non-polymeric molecule that changes color when oxidized or reduced by an electric current.

10 2. The optical switch of Claim 1 wherein said organic non-polymeric molecule comprises a substituted tetrazole.

 3. The optical switch of Claim 2 wherein said substituted tetrazole is represented by the formula

15



where R₁, R₂, R₃, and R₄ are independently H, alkyls, or aryls and the ring carbon is in the 3-position.

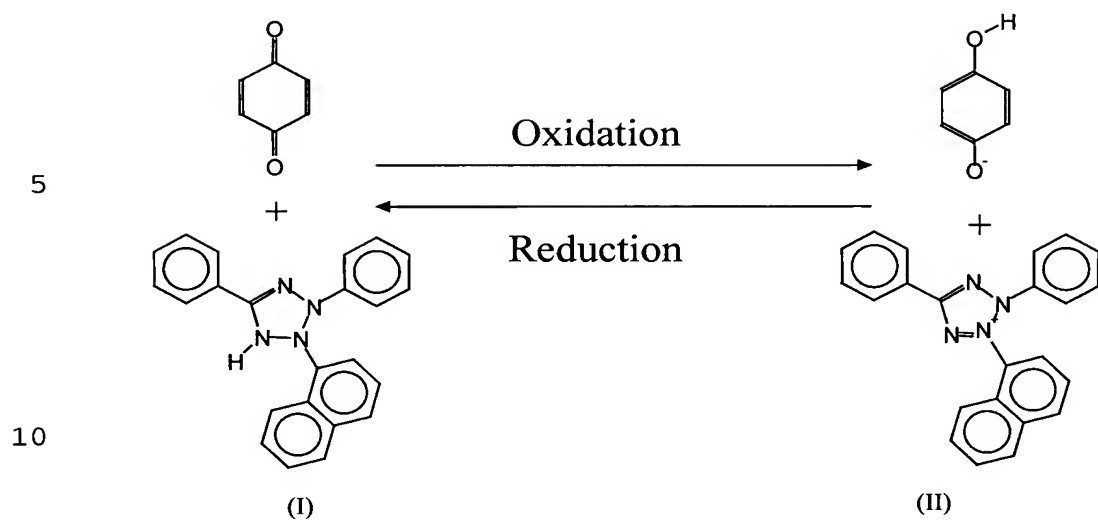
20

 4. The optical switch of Claim 3 wherein any two of R₁, R₂, R₃, and R₄ are alkyls and/or aryls, and the remainder hydrogen.

 5. The optical switch of Claim 3 wherein the ring carbon is in the 2-position.

25

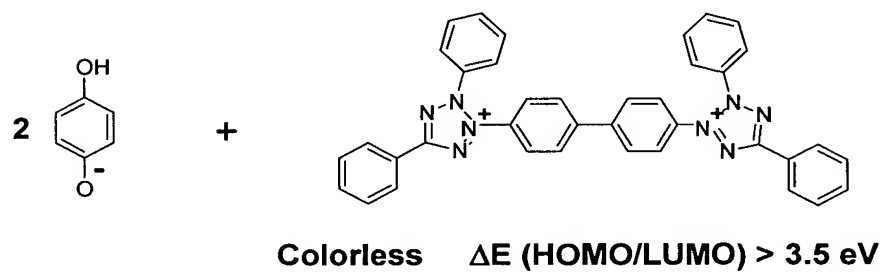
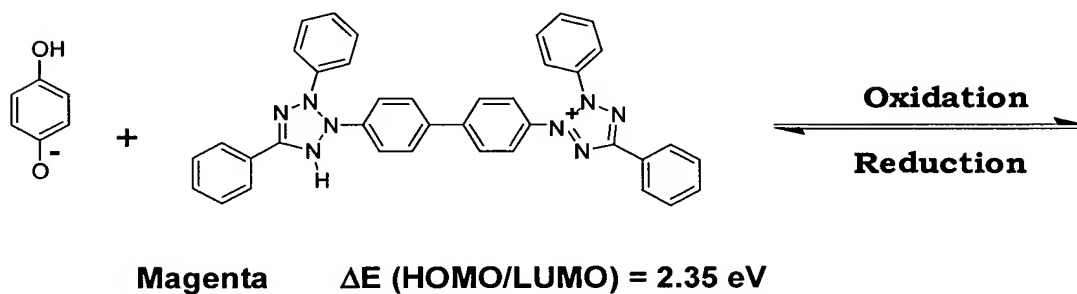
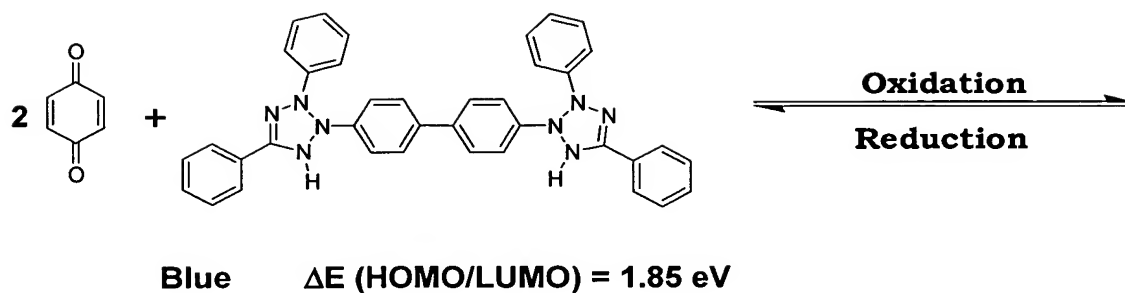
 6. The optical switch of Claim 3 wherein said molecular system comprises:



wherein (I) is purple and has a $\Delta E_{\text{HOMO/LUMO}} = 2$ eV and wherein (II) is colorless and has a $\Delta E_{\text{HOMO/LUMO}} > 3.5$ eV.

15

7. The optical switch of Claim 3 wherein said molecular system comprises:



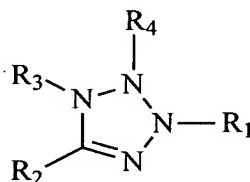
- 5 wherein (III) is blue and as a $\Delta E_{\text{HOMO/LUMO}} = 1.85 \text{ eV}$, wherein (IV) is magenta and has a $\Delta E_{\text{HOMO/LUMO}} = 2.35 \text{ eV}$, and wherein (V) is colorless and has a $\Delta E_{\text{HOMO/LUMO}} > 3.5 \text{ eV}$.

8. A molecular system configured between a pair of electrodes, said molecular system including at least one organic non-polymeric molecule that changes color when oxidized or reduced by an electric current.

5 9. The molecular system of Claim 8 wherein said organic non-polymeric molecule comprises a substituted tetrazole.

10. The molecular system of Claim 9 wherein said substituted tetrazole is represented by the formula

10



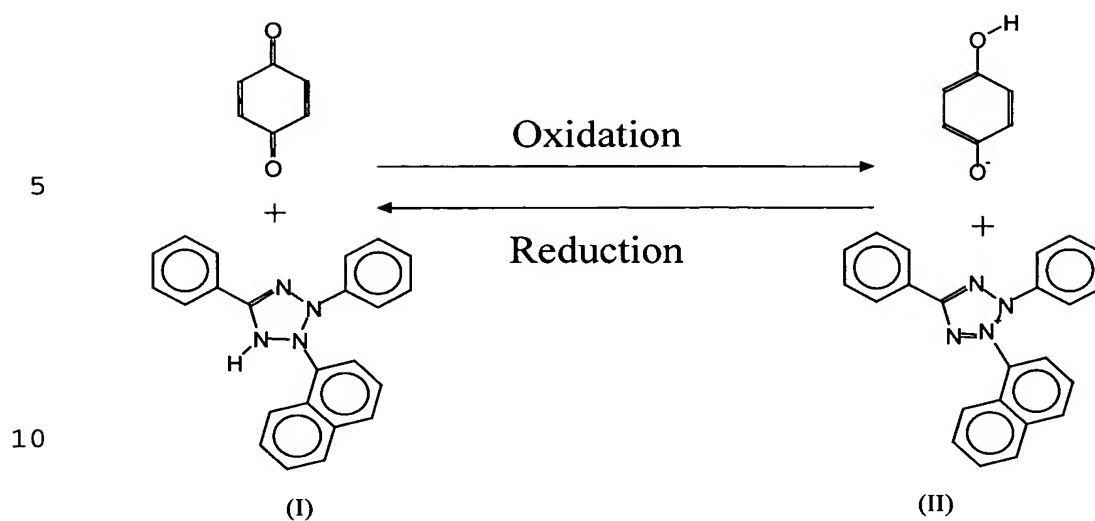
where R₁, R₂, R₃, and R₄ are independently H, alkyls, or aryls and the ring carbon is in the 3-position.

15

11. The molecular system of Claim 10 wherein any two of R₁, R₂, R₃, and R₄ are alkyls and/or aryls, and the remainder hydrogen.

12. The molecular system of Claim 10 wherein the ring carbon is in the 2-
20 position.

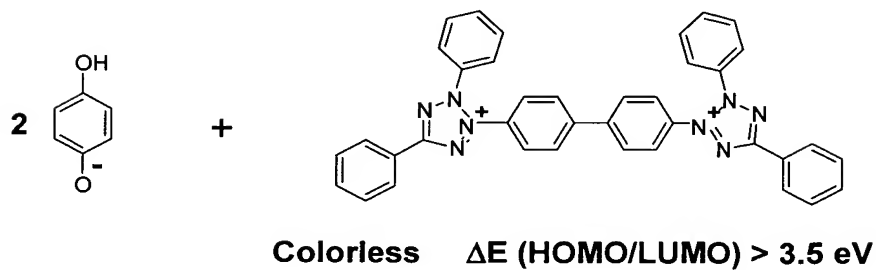
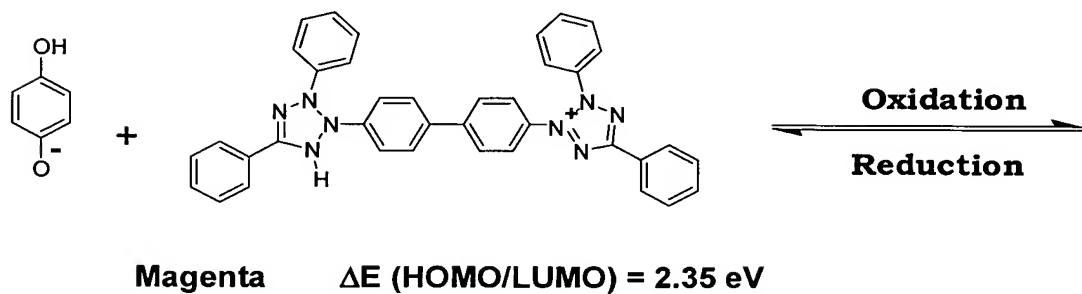
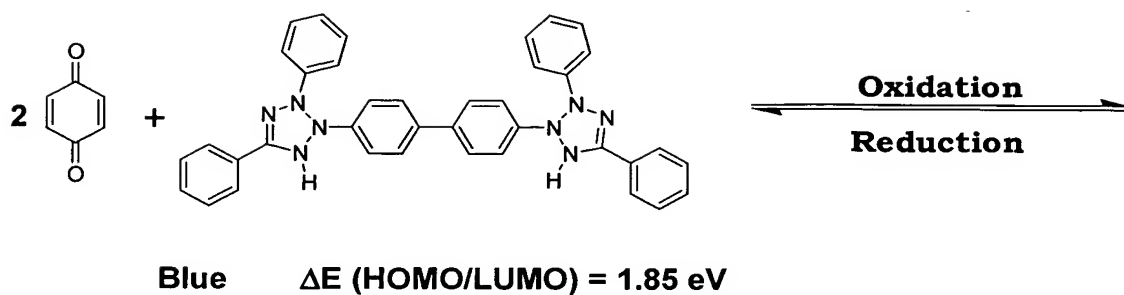
13. The molecular system of Claim 10 wherein said molecular system comprises:



wherein (I) is purple and has a $\Delta E_{\text{HOMO/LUMO}} = 2 \text{ eV}$ and wherein (II) is colorless and has a $\Delta E_{\text{HOMO/LUMO}} > 3.5 \text{ eV}$.

15

14. The molecular system of Claim 10 wherein said molecular system comprises:



- 5 wherein (III) is blue and as a $\Delta E_{\text{HOMO/LUMO}} = 1.85$ eV, wherein (IV) is magenta and has a $\Delta E_{\text{HOMO/LUMO}} = 2.35$ eV, and wherein (V) is colorless and has a $\Delta E_{\text{HOMO/LUMO}} > 3.5$ eV.